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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/724,910	11/28/2000	Hugh J. Pasika	7414.0025 / 4615	8658

22896 7590 12/13/2007

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EXAMINER	
WHALEY, PABLO S	
ART UNIT	**PAPER NUMBER**
1631	

MAIL DATE	DELIVERY MODE
12/13/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/724,910	PASIKA ET AL.	
	Examiner	Art Unit	
	Pablo Whaley	1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *52-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *52-57* is/are rejected.

7)☒ Claim(s) *52-57* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Request For Continued Examination

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 09/24/2007 has been entered. Applicant's are encouraged to refrain from the use of "bullets" in future claims, as they are not printable in patents and do not appear to add any information to the claimed subject matter.

Claims Under Examination

Claims 52-57 are under examination. Claims 1-51 are cancelled.

Priority

Priority to US Provisional Application 60/227,556, filed 8/23/2000, has been acknowledged.

Claim Objections

Claims 52-57 are objected to because of the following informalities:

Claim 52 and 55 are grammatically incorrect to due to the recitation of the misspelled term "envelop" in line 4 of claims 52 and 55. Appropriate correction is required.

Withdrawn Rejections

The rejection of claims 52-57 are rejected under 35 USC § 102 (b) as being anticipated by Ng (Automating Computation Molecular Genetics, Thesis Dissertation, Carnegie Mellon University, School of Computer Science, 1998, Abstract and p. 32, 142-148, and 279) is withdrawn in view of applicant's arguments and amendments to claim 52, filed 09/24/2007.

The rejection of claims 52-57 are rejected under 35 U.S.C. 103(a) as being made obvious by Perlin (US #6,807,490; filed Feb. 15, 2000), in view of ABI PRISM Genotyper 2.5 User's Manual (PE Biosystems, Copyright 1998, p.1-354) is withdrawn in view of applicant's arguments and amendments to claim 52, filed 09/24/2007.

Claim Rejections - 35 USC § 112, 2nd Paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 52-57 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 52 and 55 recite "determining if at least three panels exist, and if so." The limitation "and if so" is indefinite, as it is unclear what active method steps is intended in the case where less than three panels exist.

Claim Rejections - 35 USC §101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 55 and 57 are rejected under 35 U.S.C. 101 because these claims are drawn to non-statutory subject matter. Claims 55 and 57 are drawn to a computer readable medium for carrying out a process. For a claimed process to be statutory, it must provide: (1) a practical application by physical transformation (i.e. reduction of an article to a different state or thing), or (2) a practical application that produces a concrete, tangible, and useful result [State Street Bank & Trust Co. v. Signature Financial Group Inc. CAFC 47 USPQ2d 1596 (1998)], [AT&T Corp. v. Excel Communications Inc. (CAFC 50 USPQ2d 1447 (1999)]. Furthermore, the claims must be limited only to statutory embodiments. In the instant case, the claimed computer-readable medium encompasses non-statutory embodiments of computer readable media drawn to carrier waves, as set forth in the specification [p.38, ¶3]. Because carrier waves are not a tangible medium, the instant claims do not recite a tangible result in a form that is useful to the user of the process. This rejection could be overcome by amendment of the specification to delete limitations directed to carrier waves.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 52-57 are rejected under 35 U.S.C. 103(a) as being made obvious by Ng (Automating Computation Molecular Genetics, Thesis Dissertation, Carnegie Mellon University, School of Computer Science, 1998, Abstract and p. 1-389), in view of Gilchrist et al. (US 5,916,747; Issued Jun. 29, 1999).

The instantly claimed invention is drawn to a method and program for processing fragment analysis data comprising: Receiving the fragment analysis data wherein the data represents intensity values and nucleic acid fragment length information; determining the peaks of the fragment analysis data and forming a signal envelop from said peaks; determining the minima and maxima of the signal envelope and dividing the signal envelope into panels with boundaries at each local minimum; determining if at least three panels exist, and if so,

computer the energy value for each panel; performing a first test by computing a first ratio of the energy value in the panel with the second greatest energy value to the energy value in the panel with the greatest energy value and determining if the first ratio exceeds a first threshold and if so, the first test is considered a pass; performing a second test by computing a second ratio of the energy value in the panel with the third greatest energy value to the energy value in the panel with the second greatest energy value and determining if the second ratio exceeds a second threshold and if so, the second test is considered a pass; calling alleles in each of the first and second panels if the first and second tests are passed; and reporting the allele calls to a user.

Ng teaches a novel computer-based analysis method (FAST-MAP) for fully automated genotyping that accurately preprocesses and calls alleles from DNA fragment data [Abstract]. Ng shows an algorithm for identifying marker bands along the continuous intensity profile of the electropherogram representing intensity values and nucleic acid fragment length information [See p.97-102, Section 5.3.3]. The algorithm analyzes peak values over a range that includes maxima and minima data values [p.96, Box 5.3, step 1 for example]. In particular, Ng shows a search algorithm for graphically determining local maximum and local minimum values in the enveloped data and dividing the signal data into panels at each local maximum [p.98, Fig. 5.9] and [p.102, Fig. 5.15]. Ng shows plotting a fitted profile of the original electropherogram signal [p.98, Fig. 5.10], which is broadly interpreted as a signal envelope. Ng also provides for "outputting" allele calls [p.279]. Ng shows algorithms (i.e. tests) for enumerating over candidate alleles based on ratios, and locally searching for best amplification ratios in a specified range (i.e. window) based on a "sum of squares" error calculation [p.142, Box 6.8]. More specifically, Ng teaches an ENUM algorithm that detects three candidate alleles and ranks all possible combinations (i.e. first, second, and third test) and reports the top three candidates [p.144, ¶ 2].

Therefore Ng clearly teaches the calculation of energy in each "binned" region based on a "sum of squares" technique, as in claims 52, 54, 55, and 57. Furthermore, as discrete allele data representing "binned" data are obtained from signal peaks with the maximum intensity [p.143, Fig. 6.12, Top and Middle Windows], and thus the application of the above algorithms to obtain candidate alleles [p.145, Fig. 6. 13] includes "panels with the greatest energy" corresponding to "maximum intensity" values, as in claims 53 and 56.

Ng does not specifically teach dividing the signal envelope into panels with boundaries at each local minimum, as in claims 52 and 55.

Gilchrist et al. teaches a method for alignment and normalization of trace data signals for improved base calling. In particular, data that includes creating windows from trace data, determining the peaks of the analysis data, and determining peaks and values (i.e. maxima and minima) [Fig. 4A and 4B] and [Col. 6, lines 40-60]. In particular, the windows occur at peak minima. Gilchrist also show applying algorithms to each point of trace data within a window to modify its position and change the cost area function (i.e. energy). The presentation of aligned data sets is then made available for further use for base-calling and other purposes [Col. 8, lines 58-67]. Gilchrist also show a preferred approach to base-calling of aligned data wherein minimum peak height is selected by the user to avoid spurious results [Col. 9, lines 1-10].

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to practice to method of Ng et al. with the modification of dividing the signal into panels at local minimum values, as taught by Gilchrist, since Ng teaches the alignment of marker band data [p. 91 and p.118], resulting in the practice of the instantly claimed invention with predictable results. One of ordinary skill in the art would be motivated to make the above modification in order to exclude local minimum values from the computational process, as

suggested by Ng [p.104, ¶3] and to provide an improved method of base-calling, as suggested by Gilchrist [Col. 2, lines 5-25].

Claims 52-57 are rejected under 35 U.S.C. 103(a) as being made obvious by Northeastern University (WO/1999/53423; International Publication Date: Oct. 21, 1999), in view of ABI PRISM Genotyper 2.5 User's Manual (PE Biosystems, Copyright 1998, p.1-354).

Northeastern University teaches a base-calling algorithm that includes determining spectra from raw intensity data; performing color separation via least-squares fitting of spectral data; detecting peaks based on thresholding or local maxima/minima; and assigning base calls if a plurality of rules are met [See p.13 and p.19-23]. A peak subdivision procedure for dividing peak data based local minima [p.37-38] is shown. This procedure improves the base-calling assignment rules. Furthermore, a noise minimization process is shown wherein peaks are divided into regions based on local minima values when local maxima peaks are separated by large valleys [p.29, lines 10-20], which equates to dividing a signal into panels at each local minima. The greatest integrated signal in each peak-containing region is determined [p.30], which equates to determining energy values for each panel. Locations for all local minima are determined for peak containing windows based on second derivatives functions that include peak width [p.31]. Allele calls are reported to a user [Fig. 4] and [p.15, ¶1].

Northeastern University does not specifically teach computer a first and second ratio of energy values, as in claims 52, 54, 55, and 57.

ABI PRISM teaches a genotyping software system providing for manual and automated labeling and analysis of DNA fragments. ABI PRISM generally teaches receiving fragment

analysis data [p.71, Section 3-13]; displaying and providing user with means to label signals comprising peak and size information [p.116]; user-definable categories for defining specific peak ranges, peak maxima and minima [p.119-120], and specifically teaches methods for comparing data quality of any peaks based on "ratios" and "sum of squares" [p.210 and p.212].

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to practice the allele calling method of Northeastern University with the additional analysis steps taught by ABI PRISM, since ABI PRISM suggests linking their software to third-party programs or files for further analysis of fragment peak data [p.278, Section 11-1] and [p. 292, Section 12-7]. One of ordinary skill in the art would have been motivated to combine the above teachings in order to improve base-calling accuracy using an automated software quality system.

Response to Arguments

Applicant's arguments, filed 09/24/2007, that Ng et al. does not teach marker bands (i.e. panels) based on maxima and minima nor a signal envelope, as claimed by applicant, have been considered but are moot in view of the new grounds of rejections.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pablo Whaley whose telephone number is (571)272-4425. The examiner can normally be reached on 9:30am - 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marjorie Moran can be reached at 571-272-0720. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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